

**Water and Environmental Programs
Engineering Success Stories**

STATE: New Jersey
BORROWER NAME: City of Cape May
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City of Cape May Desalination Treatment Plant Reverse Osmosis Water Treatment Plan

Description of Problem/Issues:

The City of Cape May is a main resort city in the State of New Jersey. It is located at the Southern tip of the State. The City is surrounded by water in almost every direction. From the East and South is the Atlantic Ocean, from the West is the Delaware Bay, and from the North is Cape May Canal.

The City is known as a historic city and is one of the most popular tourist attractions. The winter population, as per 1990 Census is 4,665. This number increases up to six times in the summer time.

The City owns and operates its water system, which comprises of water wells, storage tanks and water distribution system. This water system currently supplies water to the Boroughs of Cape May Point, West Cape May, portions of Lower Township, and U.S. Coast Guard Base, in addition to the City of Cape May. The system services 6650 as current users. This number is expected to be 7650 by the year 2020.

The Cohansey aquifer is the main source of the water supply to the city. Studies published by the U.S.G.S. indicate that the Cohansey aquifer is being threatened by increasing levels of salt-water intrusion.

Therefore, the city is faced by two main problems with their water system. The first one is to increase the amount of water to meet the needs of Cape May and its customer municipalities through the year 2020. The second one is the problem of the salt water intrusion.

To overcome these problems, the City of Cape May considered a few alternatives for evaluation. These alternatives were:

1. Wastewater Recharge:

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The existing three supply wells No. 3,4, and 5, for the City of Cape May are screened in the Cohansey Aquifer. In the area of Southern Cape May, the Cohansey Aquifer is 125' to 175' thick, and the top of the aquifer is approximately 200' to 250' below ground surface.

During the pre-development period (around 1890), water levels in the Cohansey were above sea level. However, a cone of depression has formed that is between 20' and 25' below sea level on average as a result of current withdrawals by Cape May City. The cone of depression exceeds 40' below sea level in the summer months when withdrawal is at its peak. As a result, saltwater contamination is advancing inland at an estimated rate of 221 feet per year and will eventually effect all of the area's wells.

Wastewater recharge is an alternative to conserve potable water supplies by using treated wastewater effluent to recharge aquifers. Wastewater reuse is an alternative to conserve potable water supplies by using treated wastewater effluent to recharge aquifers. Wastewater reuse is an alternative to conserve potable water supplies by using treated wastewater effluent for the purpose of irrigating agricultural or recreational areas. Presently, there are no recreational users in the City or private wells within the study area. Also there are no major agricultural users connected to the city's water supply.

Based on the limited use of irrigation, wastewater reuse for irrigation does not appear to be a cost effective option for the City of Cape May.

2. No Action:

This alternative is not practical.

3. Conjunctive Use of Freshwater:

This alternative calls for drilling two new wells at the neighboring Township. (Lower Twp) to the Holly Beach and Estuarine Sand Aquifer. These wells will cover the increase in the water demand in the summertime. However, this alternative does not address the issue of the salt water intrusion at the Cohansey Aquifer.

Therefore, this alternative is considered to be short term solution.

4. Interconnections with Neighboring Existing Water Systems:

Under this alternative, the City of Cape May has to construct the transmission main or pay for it. In either case the cost will be high besides the city would have limited control over their water supply.

5. Construction of 2 MGD Desalinated Water Supply:

This alternative was evaluated and found to be the most practical and cost effective alternative.

SOLUTION:

Water Desalination Facility is the most acceptable alternative for the City of Cape May. This alternative will help the city to meet its water demand, and reverse/or at least, reduce the salt water intrusion to the Cohansey Aquifer.

This alternative calls for the construction of a 2 mgd desalination facility to be built at the existing water treatment plant. The feed water for the desalination facility will be from the "800 foot Sand" Aquifer. The water from this aquifer is expected to be brackish, similar in character to portions of the Cohansey Aquifer that have already been influenced by salt water intrusion. A reverse osmosis process using ultra low pressure, thin film composite membranes will reduce the brackish water salinity to a level suitable for potable use.

This alternative could be constructed in stages that the city could financially afford, and meet their future water demand. The estimated project cost of this alternative is \$5.3 million.

This technology of desalination of the salt water, has been used overseas by our American Arm Forces. Therefore, it is not a new technology. However, it is the first time for this technology to be applied in the State of New Jersey. If this technology proves to be practical and cost effective, the shore communities, which are under the threat of salt water intrusion, will be looking forward to utilizing this desalination process for their water supplies.
